

**REMARKS**

In the present Amendment, claim 1 has been amended to recite that the softening agent (a) further contains a hydrogenated naphthenic oil and asphalt wherein the asphalt contains an asphaltene component not more than 5% by mass of the asphalt. Section 112 support for the amendment is found, for example, in paragraph [0013] of the specification. Further, claim 1 has been amended to delete the recitation “the oil is at least one process oil selected from the group consisting of T-DAE and MES.” Claims 7 and 10 have been amended consistent with the amendment to claim 1. New claims 19-22 have been added. Claim 19 corresponds to the currently amended claim 1 plus the recitation “the oil is at least one process oil selected from the group consisting of T-DAE and MES.” Section 112 support for claim 20 is found, for example, in Examples 1-3 of the specification. Section 112 support for claims 21 and 22 is found, for example, in paragraph [0008] of the specification. No new matter has been added, and entry of the Amendment is respectfully requested.

Upon entry of the Amendment, claims 1-3, 6-12, and 15-22 will be pending.

In paragraph No. 2 of the Action, claims 1-3, 6-12 and 15-18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Rawlinson et al (U.S. 2002/0198296) in view of Imai (U.S. 4,360,049).

Applicants submit that this rejection should be withdrawn because Rawlinson et al and Imai do not disclose or render obvious the present invention, either alone or in combination.

Rawlinson et al is cited as disclosing a rubber composition for use in tire tread comprising mineral oils having DMSO extraction of less than 3 wt % (abstract, [0024]-[0025]), which can be MES, TDAE as well as mineral oils such as naphthenic oils or hydrogenated naphthenic oils ([0025]).

The Examiner states that the difference between the teachings of Rawlinson et al and the instant invention lies in newly added limitation to the independent claims, which limitation includes rubber viscosity.

With due respect, the Examiner's statement is not correct, because the "newly added limitation" was that "the oil is at least one process oil selected from the group consisting of T-DAE and MES," which does not include rubber viscosity.

Nonetheless, Applicants believe that the Examiner intended to rely upon Imai as teaching a rubber composition comprising 5-60 parts by weight of a liquid polymer having a viscosity average molecular weight of 2,000-150,000 (abstract and col. 2, lines 53-64).

The Examiner contends that it would have been obvious to utilize such oil with rubbers having viscosity molecular weight as those disclosed in Imai and thereby obtain the claimed invention, because such modification would provide tire tread having improved wet skid resistance, wherein the oil would still extend the rubber as it is taught in Rawlinson et al.

Applicants respectfully traverse.

Present claim 1 as amended relates to a rubber composition for a tread characterized by compounding (a) 5-40 parts by mass of a softening agent including an oil in which an extraction quantity with dimethylsulfoxide (DMSO) by IP346 process is controlled to less than 3% by mass and (b) 5-40 parts by mass of a liquid polymer having a viscosity average molecular weight of 45,000-100,000 based on 100 parts by mass of a rubber component. The softening agent (a) further contains a hydrogenated naphthenic oil and asphalt wherein the asphalt contains an asphaltene component not more than 5% by mass of the asphalt.

Applicants disclose in paragraph [0013] of the specification that as the asphalt, it is preferable that an asphaltene component is not more than 5% by mass considering the affinity with the synthetic rubber used and the effect as the softening agent.

Rawlinson et al and Imai do not teach or suggest asphalt as a softening agent, much less the asphalt containing an asphaltene component not more than 5% by mass and the effects thereof.

Further, the Examiner has not provided a good reasoning or motivation as to why one skilled in the art would have added the liquid polymer taught by Imai to Rawlinson et al's rubber composition.

As the Examiner acknowledges, Rawlinson et al already teaches a rubber composition containing the oils provides a tire tread with improved wet skid behavior.

Therefore, one skilled in the art would not have looked to Imai for other components in order to "provide tire tread having improved wet skid resistance," as asserted by the Examiner.

Still further, the Examiner has not pointed out any teachings in Imai which would have led one skilled in the art to modify the rubber composition of Rawlinson et al by adding the liquid polymer of Imai.

Finally, none of the references teach or suggest that the rubber composition comprising all of (1) an oil with a DMSO extraction quantity of less than 3% by mass, (2) hydrogenated naphthenic oil and asphalt containing asphaltene component not more than 5% by mass of asphalt, and (3) the liquid polymer, as required by the present claims.

As shown in Table 1 at page 8 of the specification, the compositions of Examples 1-3 of the invention considerably improve the tensile strength and wear resistance while maintaining the modulus of elasticity, as compared with Comparative Examples 1 and 2. In Comparative

Example 1, only aromatic oil was employed, no oil with an extraction quantity with dimethylsulfoxide (DMSO) by IP346 process of less than 3% by mass and no liquid polymer. In Comparative Example 2, TDAE and a blend of hydrogenated naphthenic oil and asphalt were employed, but no liquid polymer.

None of the references teach or suggest the superior results provided by the present invention.

Accordingly, the present claims are not obvious over Rawlinson et al in view of Imai.

In view of the above, reconsideration and withdrawal of the §103(a) rejection based on Rawlinson et al in view of Imai are respectfully requested.

In paragraph No. 3 of the Action, claims 1-3, 6-12 and 15-18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sohnen et al (U.S. 2002/0045697) in view of Imai.

Applicants submit that this rejection should be withdrawn because Sohnen et al and Imai do not disclose or render obvious the present invention, either alone or in combination.

Similar to the previous rejection based on Rawlinson et al in view of Imai, in the present rejection, Sohnen et al is cited as disclosing a rubber composition for use in tire tread containing hydrogenated naphthenic oils having DMSO extraction of less than 3 wt % ([0010]), and Imai is cited as teaching the liquid polymer.

However, Sohnen et al and Imai do not teach or suggest asphalt as a softening agent, much less the asphalt containing an asphaltene component not more than 5% by mass and the effects thereof.

Further, the Examiner has not provided a good reasoning or motivation as to why one skilled in the art would have added the liquid polymer taught by Imai to Sohnen et al's rubber composition.

As the Examiner states, Sohnen et al teaches that addition of oils to such compositions improves wet skid behavior as compared to the rubbers which do not have such oil and that the resulting composition also appears to have improved anti-staining property.

Accordingly, one skilled in the art would not have looked to Imai for other components in order to “provide tire tread having improved wet skid resistance, wherein the oil would still extend the rubber and improve anti-staining properties,” as asserted by the Examiner.

Still further, the Examiner has not pointed out any teachings in Imai which would have led one skilled in the art to modify the rubber composition of Sohnen et al by adding the liquid polymer of Imai.

Finally, none of the references teach or suggest the superior results provided by the present invention.

Accordingly, the present claims are not obvious over Sohnen et al in view of Imai.

In view of the above, reconsideration and withdrawal of the §103(a) rejection based on Sohnen et al in view of Imai are respectfully requested.

In paragraph No. 4 of the Action, claims 1, 2, 6-8, 10-12 and 15-18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Rawlinson et al and Imai in view of Hashimoto (EP 0 939 104).

In paragraph No. 5 of the Action, claims 1, 2, 6-8, 10-12 and 15-18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sohnen et al and Imai in view of Hashimoto.

Initially, Applicants believe the Examiner intended to reject the claims based on Hashimoto in view of Rawlinson et al (or Sohen et al) and Imai. Applicants' representative spoke to the Examiner and confirmed the same.

Applicants submit that the above two rejections should be withdrawn because Hashimoto, Rawlinson et al, Imai, and Sohnen et al do not disclose or render obvious the present invention, either alone or in combination.

Hashimoto is cited as disclosing a rubber composition comprising 100 parts by weight of a rubber component (natural or synthetic) and 1 to 120 parts by weight of a softening agent containing 0.1 to 4% by weight of asphaltene (abstract and [0006]).

Applicants note that asphaltene is not the same as asphalt. Asphaltene is one of many components of asphalt.

Hashimoto discloses that it is preferable that the softening agent is prepared by dissolving the asphalt into a processing oil ([0014]). Hashimoto further discloses that the amount of the asphalt to be added to the processing oil is preferably 8 to 40% by weight based on the amount of the processing oil ([0018]).

Accordingly, the asphaltene content in asphalt of Hashimoto is calculated as follows:

Max content:  $4\%(\text{asphaltene})/8\%(\text{asphalt}) * 100 = \underline{50\%}$

Min content:  $0.1\%(\text{asphaltene})/40\%(\text{asphalt}) * 100 = \underline{0.25\%}$

That is, Hashimoto teaches a rubber composition containing asphalt with the asphaltene content of 0.25% to 50% by mass of asphalt.

In contrast, the present claims require an asphalt containing asphaltene component not more than 5% by mass of asphalt.

Hashimoto does not teach or suggest the claimed narrow range (not more than 5%) of asphaltene content and the effects thereof.

To make the comparison of the present invention with Hashimoto and Imai clear, Applicants provide the following Table.

	Amount of Softening Agent	Asphaltene
Hashimoto	1-120 phr =oil+asphalt	0.1-4% of oil (0.25-50% of asphalt)
Imai	Under 10 phr	-
Present invention	5-40 phr (Example: Oil B: 13 phr)	Not more than <u>5%</u> by mass of asphalt

Further, the Examiner has not provided a good reasoning or motivation as to why one skilled in the art would have modified Hashimoto's rubber composition in view of the teachings of Rawlinson et al (or Sohen et al) and Imai.

Still further, the Examiner has not pointed out any teachings in Imai which would have led one skilled in the art to modify the rubber composition of Hashimoto by adding a liquid polymer of Imai.

Finally, none of the references teach or suggest the superior results provided by the present invention.

In view of the above, reconsideration and withdrawal of the §103(a) rejections based on Hashimoto, Rawlinson et al, Imai, and Sohnen et al are respectfully requested.

In paragraph No. 6 of the Action, claims 1, 2, 6-8, 10, 11, 12, 15, 16 and 18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Russell et al (GB 2,239,870) in view of Rawlinson et al and Imai.

In paragraph No. 7 of the Action, Claims 1, 2, 6-8, 10, 11, 15, 16 and 18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sohnen et al and Imai in view of Russell et al [sic, Russell et al in view of Sohnen et al and Imai].

Applicants submit that the above two rejections should be withdrawn because Russell et al, Rawlinson et al, Imai and Sohnen et al do not disclose or render obvious the present invention, either alone or in combination.

Russell et al is cited as disclosing a rubber composition containing a liquid polymeric material and/or one or more asphaltenes present in 1 to 50 parts per 100 parts rubber (Claim 1 and rubber mixture B at page 4).

The object of Russell et al is to provide a rubber mixture composition that does not cause discoloration and is environmentally friendly.

The main elements recited in Claim 1 of Russell et al are:

- 1) Filler
- 2) Plasticizers: ester and/or naphthenic or paraffinic oil
- 3) Liquid polymeric material ("liquid polyisoprene" in embodiment example) and/or asphaltenes 1-50 phr
- 4) Vulcanizing agents

The differences between the present invention and that of Russell et al are shown in the following Table.

		Present Invention	Russell et al
1)	Asphalt	Asphalt required	Not disclosed
2)	Asphaltene	Claim 7 0.0125-1.9 phr (per 100 parts rubber)	1-50 phr (per 100 parts rubber)
3)	Liquid polymer	Molecular weight 45,000-100,000	Not disclosed

The asphaltene content in present claim 7 is calculated as follows:



Oil: 5-40 phr per 100 parts rubber component

Asphalt: 5-95% of Oil

Asphaltene: not more than 5% in asphalt

Maximum asphaltene content:  $\frac{1.9\text{phr}}{40\text{phr(oil)}} = 0.0475$  (asphalt) x 0.05 (asphaltene)

Russell et al does not disclose asphalt but only asphaltene. And Russell et al does not disclose asphaltene's content in asphalt.

In contrast, the present claims require asphalt and asphalt containing asphaltene not more than 5% by mass of asphalt.

Further, the content of asphaltene recited in present claim 7 is 0.0125-1.9 phr per 100 parts rubber.

In contrast, Russell et al claims 1-50 phr asphaltene per 100 parts rubber and its embodiment example used 5 phr.

With respect to liquid polymer, generally there are two types, high molecular weight polymers and low molecular weight polymers. It is well known that compounds with them show entirely different physical properties.

Russell et al never distinguishes them and includes no disclosure about molecular weight of the liquid polymer.

However, the present claims require a molecular weight 45,000-100,000.

The differences between high molecular weight liquid polymers and low molecular weight liquid polymers are explained as follows.

- a) Low molecular weight liquid polymer: molecular weight 2,000-20,000

This low molecular weight liquid polymer is not tangled with matrix polymers in rubber composition. So it moves semi-freely in the rubber composition. When

deformation is added to the rubber composition, the power is changed to liquid polymers moving = absorbed in the component, that is changed to heat. So the rubber component shows high Tan D. High Tan D means high rolling resistance and high grip. And this type of liquid polymer works as plasticizer well so it shows low E' and modulus.

- b) High molecular weight liquid polymer; molecular weight 45,000 - 100,000

This high molecular weight liquid polymer is tangled with matrix polymer and after curing it is connected to matrix polymer also because it is long enough. So it is fixed in the matrix polymers. When deformation is added to the rubber composition it is not able to change to dynamic moving of liquid polymer, it shows low Tan D. On the other hand, increasing the tangled link and cross-link yield high modulus and E'. That means the composition shows low rolling resistance.

As discussed above, molecular weight of the liquid polymers is very important because the component shows entirely different physical properties. However, Russell et al discloses nothing about molecular weight of the liquid polymer.

	Liquid Polymer	Molecular weight	Physical Properties	Performance
a)	Low molecular weight	2,000-20,000	Low E' and modulus High Tan D	High rolling resistance
b)	High molecular weight	45,000-100,000	High E' and modulus Low Tan D	Low rolling resistance

Further, the Examiner has not provided a good reasoning or motivation as to why one skilled in the art would have modified Russell et al's rubber composition in view of the teachings of Rawlinson et al (or Sohen et al) and Imai.

Still further, none of the references teach or suggest the superior results provided by the present invention.

In view of the above, reconsideration and withdrawal of the §103(a) rejections based on Russell et al, Rawlinson et al, Imai, and Sohnen et al are respectfully requested.

New claims 19-22 are patentable over the cited references for at least the same reasons that claims 1-3, 6-12 and 15-18 are patentable, as discussed above, and for the additional reasons discussed below.

New independent claim 19 has the same recitation as amended claim 1 and further recites that the oil is at least one process oil selected from the group consisting of T-DAE and MES.

As pointed out in the Amendment filed February 2, 2009, Rawlinson et al discloses that the disadvantage of adding the special mineral oil such as TDAE and MES to rubbers is that the rubbers suffer a deterioration in quality, in particular as regards wet-skid behavior, which means that such rubber mixtures are not particularly suitable for use in producing, for example, tire treads ([0002]-[0004]).

The invention of Rawlinson et al is directed to particular rubber mixtures comprising a) a non-polar rubber; b) a terpolymer comprising an olefinically unsaturated nitrile, a vinyl aromatic compound and a conjugated diene; and c) a mineral oil that contains a DMSO extract in an amount of less than 3 wt %, which rubber mixtures have an improved wet-skid behavior ([0007]-[0010]).

Accordingly, Rawlinson et al teaches away from adding the special mineral oil such as TDAE and MES to rubbers, particularly styrene-butadiene and butadiene rubbers. And Rawlinson et al does not teach that addition of oils to such compositions improves wet skid behavior as compared to the rubbers which do not have such oil, as asserted by the Examiner. Rather, Rawlinson et al teaches that the specific rubber mixture disclosed therein provides an improved wet-skid behavior.

Similarly, Sohnen et al *teaches away* from adding softeners such as naphthenic oils to rubber compositions containing carbon black in general.

Sohnen et al does not teach that addition of [hydrogenated naphthenic] oil to such compositions improves wet skid behavior as compared to the rubbers which do not have such oil, as asserted by the Examiner.

Rather, Sohnen et al discloses that the *special combination* of the mineral oil softeners with glycerides and/or factices according to their invention and *the ratio of silica to carbon black* provides advantages ([0025]).

As to claim 20, which recites that the rubber composition contains not less than 13 parts by mass of hydrogenated naphthenic oil and asphalt based on 100 parts by mass of a rubber component, Imai teaches away from claim 20 because of its disclosure that “not more than 10 parts by weight of process oil, ..., may be compounded in the base rubber in order to improve the operability under unvulcanized state.” See, col. 5, lines 30-34 of Imai.

Allowance is respectfully requested. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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**23373**

CUSTOMER NUMBER

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